What is claimed is:

1. A method for producing metal particles or mixed metal particles dispersed on a particulate substrate comprising
   a. exposing an organometallic and the particulate substrate to a supercritical or near supercritical fluid under conditions to form a mixture of the fluid and the organometallic,
   b. allowing the mixture to remain in contact with the substrate for a time sufficient to deposit dispersed organometallic onto the substrate,
   c. venting the mixture,
   d. thereby adsorbing the organometallic onto the substrate, and then
   e. reducing the dispersed organometallic to dispersed metal particles with a reducing agent.
2. The method of claim 1, wherein the substrate comprises a carbonaceous material.
3. The method of claim 2, wherein the carbonaceous substrate comprises carbon black, graphite, nanocarbons, fullerenes, finely divided carbon, or mixtures thereof.
4. The method of claim 2, wherein the carbonaceous substrate comprises carbon black.
5. The method of claim 1, wherein the organometallic comprises 1,5-cyclooctadiene dimethyl platinum [$Pt(COD)Me_2$], (1,5-cyclooctadiene) (hexafluoroacetylacetonato) silver [Ag(COD)hfac], ruthenium acetylacetonate [$Ru(acac)_3$], or Ag(acac), or a mixture thereof.
6. The method of claim 1, wherein the metal particles are nanoparticles.
7. The method of claim 2, wherein the metal particles are nanoparticles.
8. The method of claim 6, wherein the nanoparticles are less than 10 nm in average diameter.

9. The method of claim 6, wherein the nanoparticles are about 0.5 nm to about 10 nm in average diameter.
10. The method of claim 6, wherein the nanoparticles are about 0.5 nm to about 5 nm in average diameter.
11. The method of claim 1, wherein the metal particles are noble metal particles.
12. The method of claim 1, wherein the metal particles comprise platinum, iridium, osmium, rhenium, ruthenium, rhodium, palladium, vanadium, chromium, gold, silver, nickel, cobalt, or a mixture thereof, or an alloy thereof.
13. The method of claim 1, wherein the metal particles comprise platinum.
14. The method of claim 1, wherein the metal particles comprise silver.
15. The method of claim 1, wherein the metal particles comprise ruthenium.
16. The method of claim 1, wherein the metal particles are mixed metal particles.
17. The method of claim 1, wherein the fluid comprises carbon dioxide, ethane, ethylene, propane, propylene, chlorotrifluoromethane, or ammonia.
18. The method of claim 1, wherein the fluid comprises carbon dioxide.
19. The method of claim 1, wherein the reducing is by addition of a reducing agent.
20. The method of claim 19, wherein the reducing agent comprises hydrogen, hydrogen sulfide, formaldehyde, sodium borohydride, hydrazine, hydroxyl amine, or a combination thereof.
21. The method of claim 19, wherein the reducing agent comprises gaseous hydrogen.
22. The method of claim 1, wherein the reducing is under pressure.
23. The method of claim 22, wherein the pressure controls the metal particle size.
24. The method of claim 1, wherein the organometallic is adsorbed while in the mixture.
25. The method of claim 1, wherein the organometallic is adsorbed when the mixture is vented.
26. The method of claim 1, wherein in step (a), at least some of the organometallic

dissolves in the fluid.

27. The method of claim 1, wherein in step (a), all or substantially all of the organometallic dissolves in the fluid.

28. A method for producing particulate substrate-supported dispersed metallic particles comprising

a. mixing an organometallic in a supercritical or near supercritical fluid to form a mixture,

b. exposing a particulate substrate to the mixture of a) under supercritical or near supercritical conditions for a period of time sufficient to deposit dispersed organometallic on the substrate,

c. venting the mixture,

d. thereby adsorbing the organometallic onto the substrate, and then

e. reducing the organometallic to dispersed metal particles with a reducing agent.

29. A method for producing particulate substrate-supported dispersed metallic particles comprising

a. adding a particulate substrate and an organometallic to a reactor,

b. adding a supercritical fluid to the reactor to form a mixture with the organometallic,

c. allowing the organometallic to remain in contact with the substrate for a time sufficient to deposit dispersed organometallic onto the substrate,

d. venting the reactor,

e. thereby adsorbing the organometallic onto the substrate, and then

f. adding a gaseous reducing agent to the reactor, and

g. contacting the reducing agent and organometallic until the organometallic is reduced to dispersed metal particles.

30. A method for producing a supported particulate catalyst for use in a fuel cell comprising

a. exposing an organometallic and a particulate substrate to a supercritical or near supercritical fluid under conditions to form a mixture of the fluid and the organometallic,

b. allowing the mixture to remain in contact with the substrate for a time sufficient to deposit dispersed organometallic onto the substrate,

c. venting the mixture,

d. thereby adsorbing the organometallic onto the substrate, and then

e. reducing the dispersed organometallic to dispersed metal particles with a reducing agent thereby forming a supported particulate catalyst, wherein the supported particulate catalyst is suitable for use in a fuel cell.

31. A method for producing a supported particulate catalyst for use in a fuel cell with a controlled catalyst particle size comprising

a. exposing an organometallic and a particulate substrate to a supercritical or near supercritical fluid under conditions to form a mixture of the fluid and the organometallic,

b. allowing the mixture to remain in contact with the substrate for a time sufficient to deposit dispersed organometallic onto the substrate,

c. venting the mixture,

d. thereby adsorbing the organometallic onto the substrate, and then

e. reducing the dispersed organometallic to dispersed metal particles with a reducing agent under pressure conditions effective to form the desired particle size thereby forming a supported particulate catalyst with controlled metal particle size.

32. The particulate composition produced by the method of claim 1.

33. The particulate composition produced by the method of claim 28.

34. The particulate composition produced by the method of claim 29.

35. The particulate composition produced by the method of claim 30.

36. The particulate composition produced by the method of claim 31.

37. A catalytic fuel cell wherein the catalyst comprises the particulate composition of claim 32.

38. A catalytic fuel cell wherein the catalyst comprises the particulate composition of claim 35.